



U.S. AIR FORCE

DoD Modeling & Simulation Executive Agent for the Air & Space Natural Environment



Gen David L. Johnson, USAF
Director, Air Force Weather



Integrity - Service - Excellence



MSEA ORIGIN

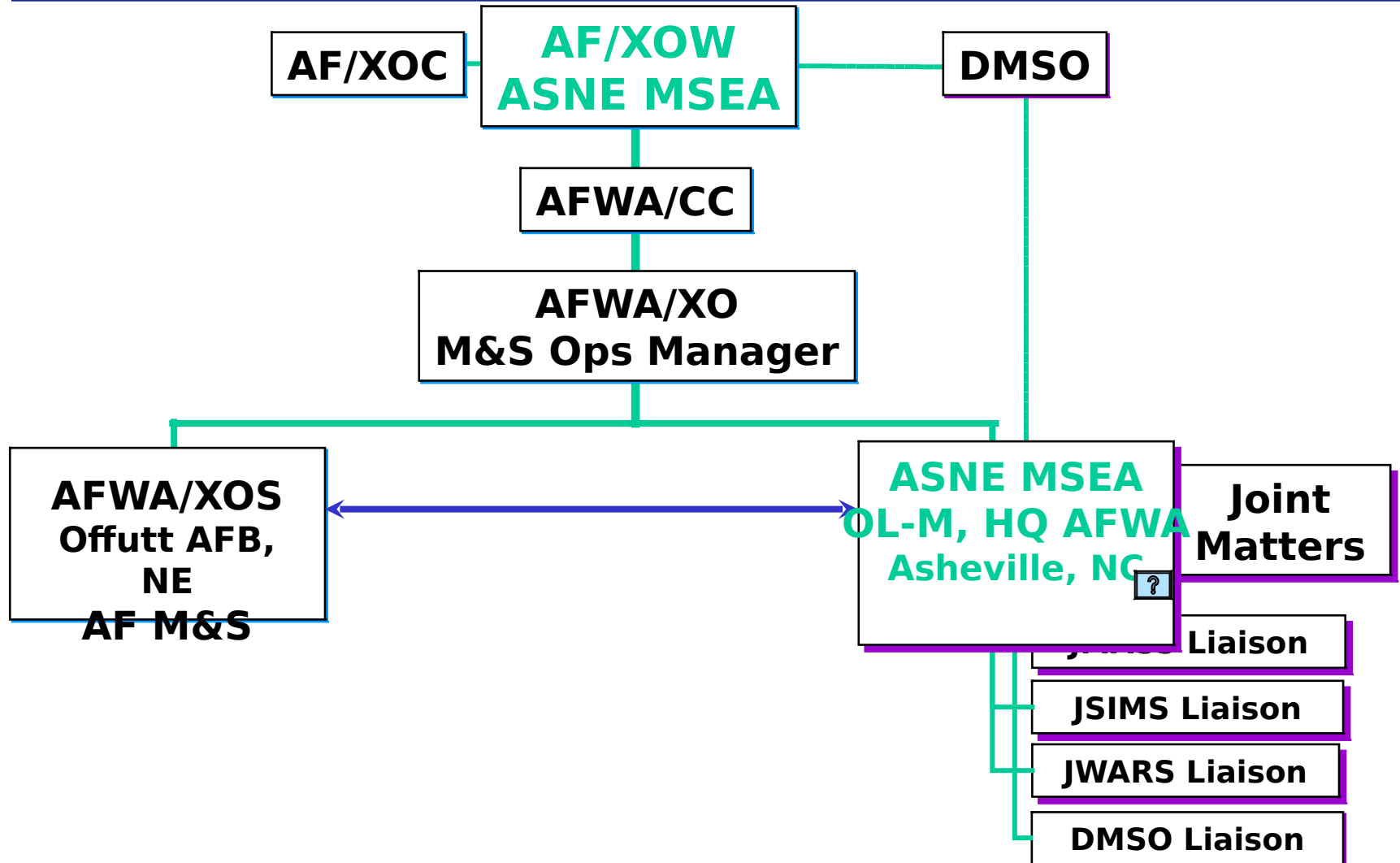
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- **DoD Modeling and Simulation (M&S) Management DoD Directive 5000.59 (Jan 94)**
 - Recommended designation of DoD Modeling & Simulation Executive Agents (MSEAs) with DoD-wide responsibilities
 - Defense Modeling and Simulation Office is DoD focal point for implementing the DoD M&S Master Plan, DoD 5000.59-P (Oct 95)
- **USD (AT&L) Memoranda**
 - **Air Force designated MSEA for Air & Space (9 Apr 96)**
 - Navy designated MSEA for Ocean (9 Apr 96)
 - National Imagery and Mapping Agency (NIMA) designated MSEA for Terrain (5 Apr 95)



ASNE MSEA ORGANIZATION

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INTEGRATED NATURAL ENVIRONMENT

■ Vision:

- Establish capabilities & infrastructure for DoD M&S programs to obtain authoritative representations of the natural environment that are readily accessible and cost effective
- Develop physically consistent representations within and among the Air, Ocean, Space, and Terrain domains
- Deliver the environment when needed in a standardized format that promotes interoperability, re-use, and confidence (includes “Just-in-Time” production)

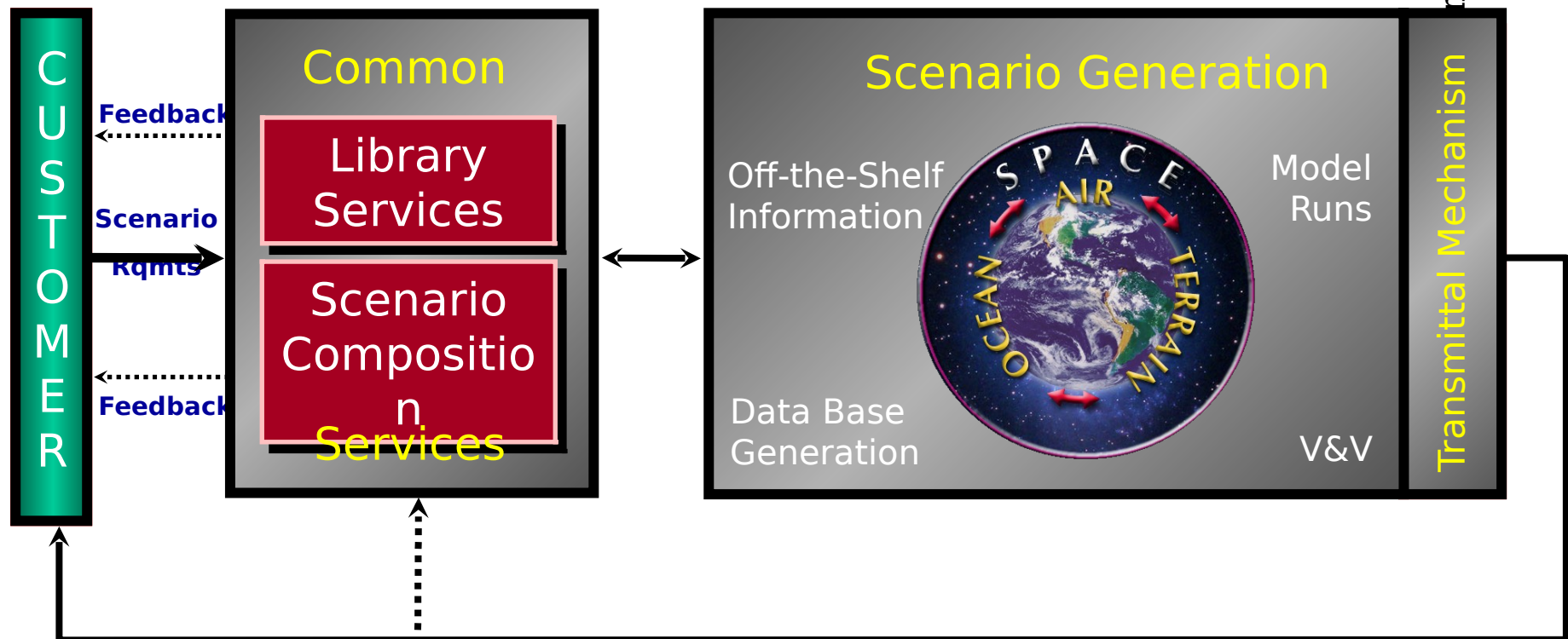


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DMSO Integrated Natural Environment Strategy

The Challenge

Create a physically consistent, cross-domain, authoritative “ground truth” of the natural environment that meets user requirements



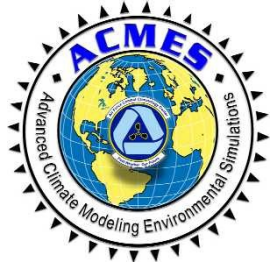
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- Establish capabilities & infrastructure for DoD M&S
 - Designated the Air Force Combat Climatology Center as the Air Force production center for M&S environmental data
 - **Fielded Advanced Climate Modeling and Environmental Simulation (ACMES)** to generate required atmospheric data
 - Host data and conduct intelligent search (mine) with the Environmental Scenario Generator (**ESG**) by end of CY01
 - Expand capabilities to meet JWARS, JSIMS, and JMASS parameter requirements by end of CY01
 - Field online capability to view weather impacts on weapons systems --Warfighter Weather Effects (**WxFX**)
 - Develop **Coupled Land-Atmospheric** Terrestrial Weather model
 - Fund development of space weather environment **models**
 - Field capability to perform weapon effectiveness calculations supporting simulations running at 1000 times real time (**CSSMStats**)

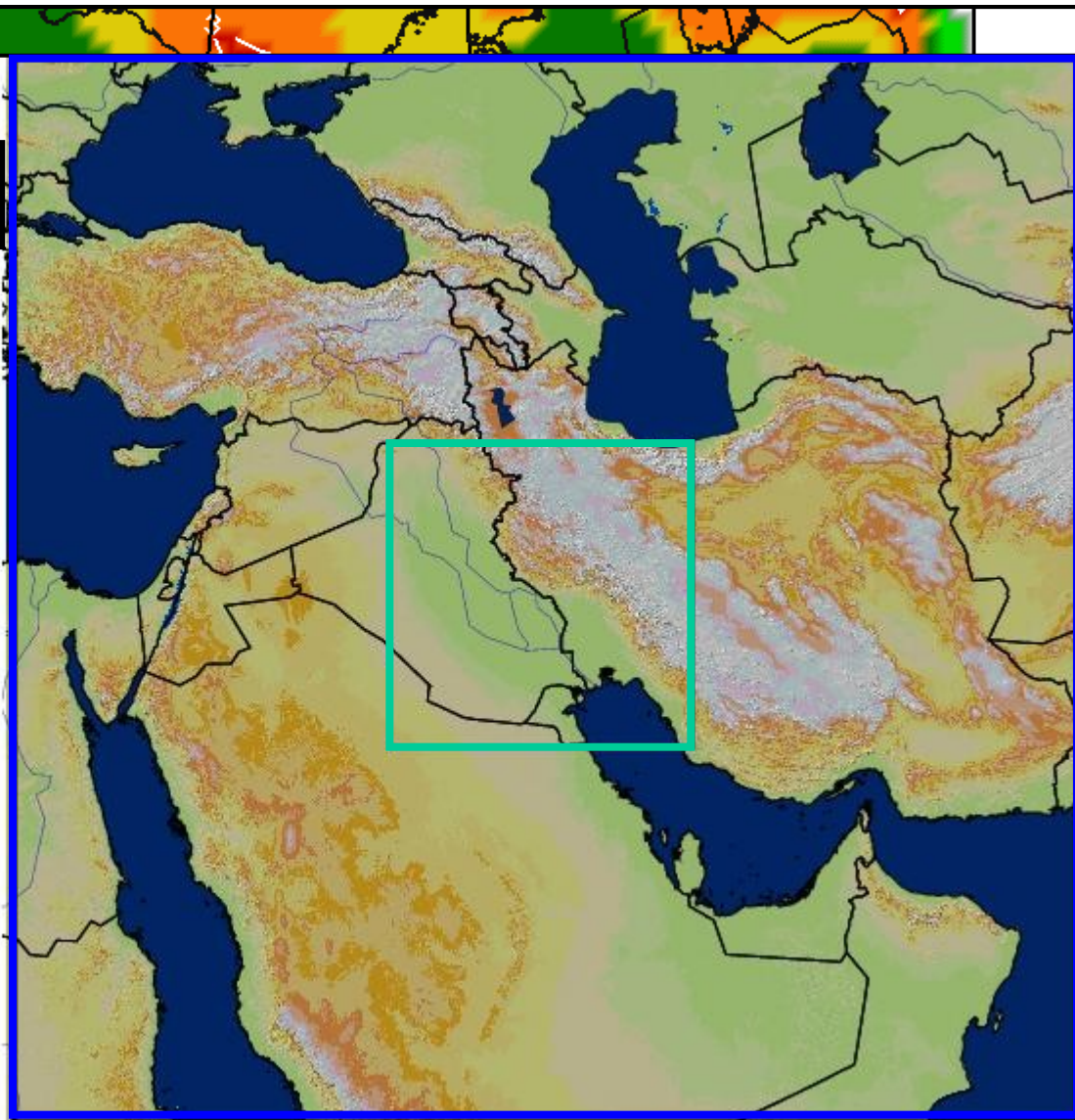
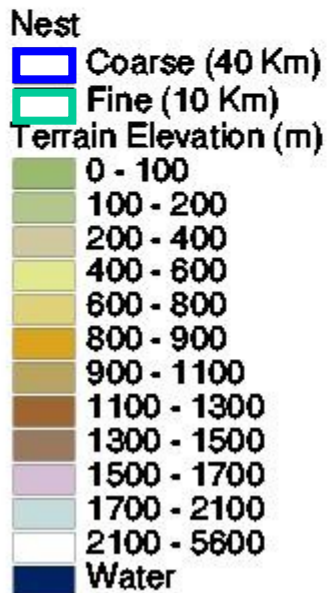


Advanced Climate Modeling & Environmental Simulations (ACMES)

ACMES
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**Terrain Data
Used for SW Asia**



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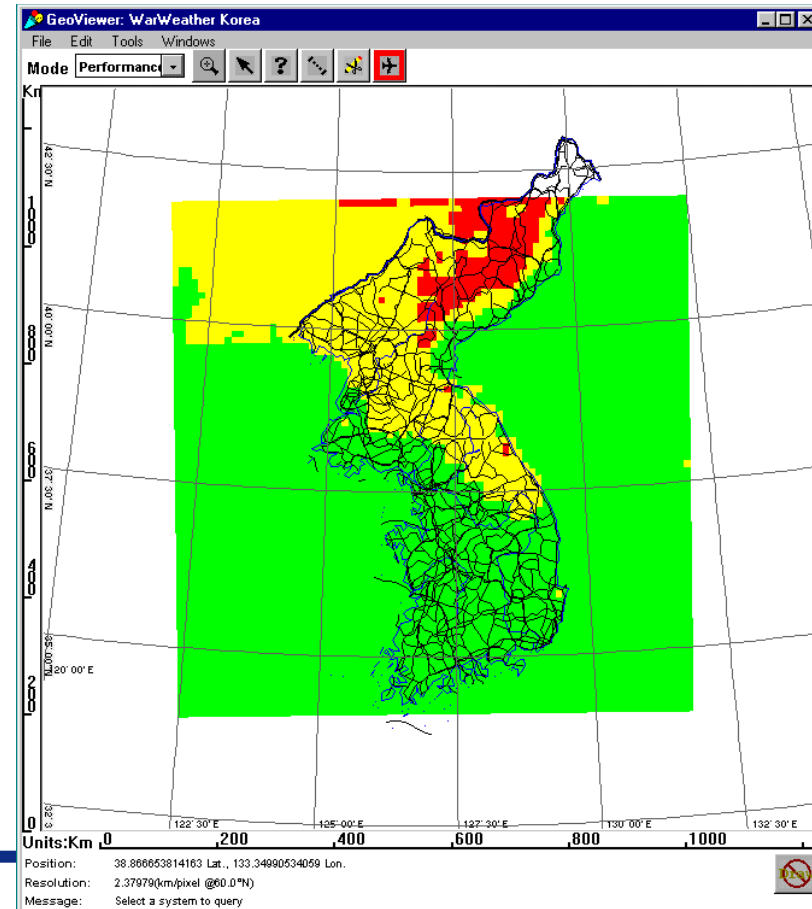
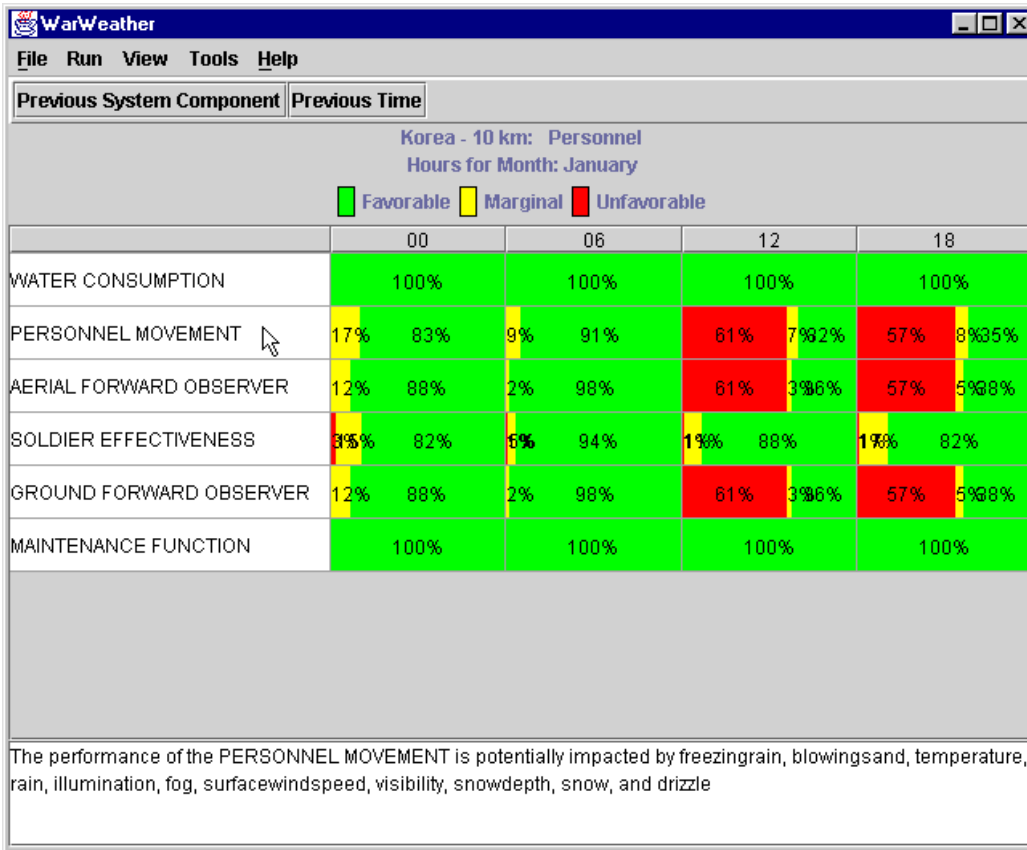
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Warfighter Weather Effects (WxFX)

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WxFX will deliver high resolution weather effects/impacts products to the warfighter for mission rehearsal and long-range planning.



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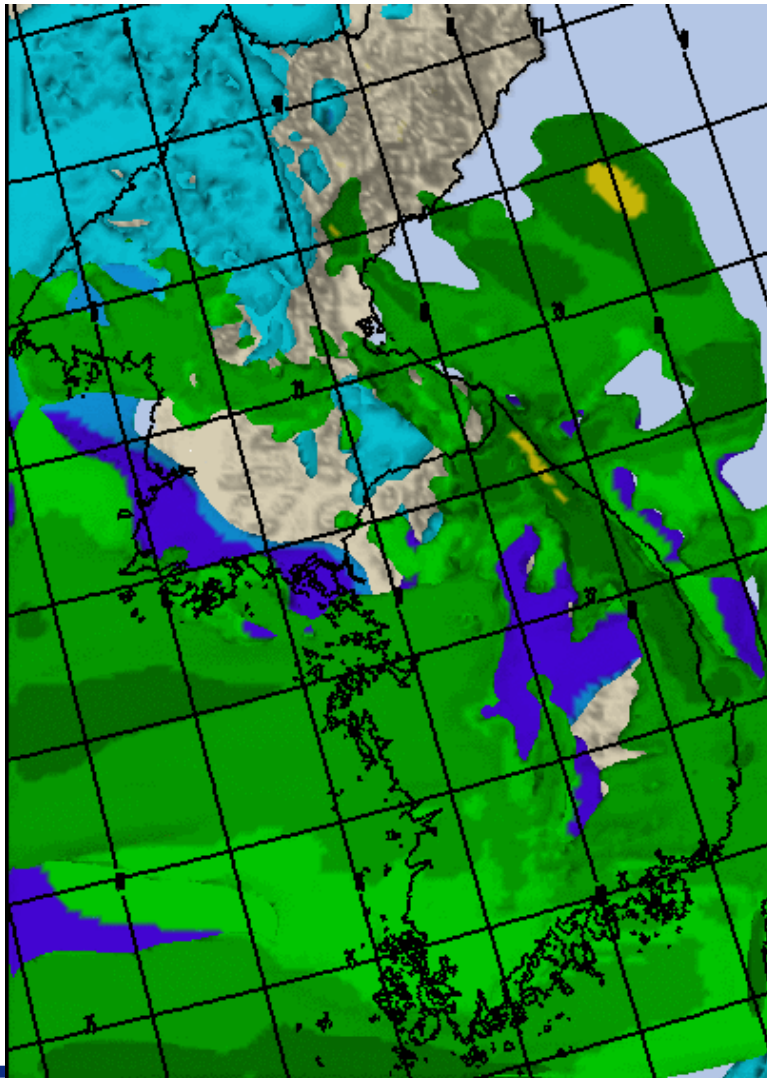
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High Resolution Atmospheric Model (MM 5)



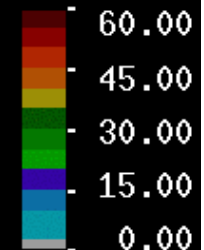
17 Feb 01
Saturday
0600Z
24hr FCST

Vis5D

Air Force
Weather
Agency

MM5 5.0Km
Model Time
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H_KFT



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Cloud Tops (MSL)



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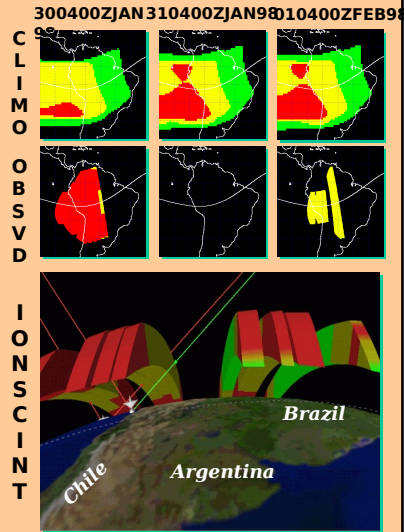
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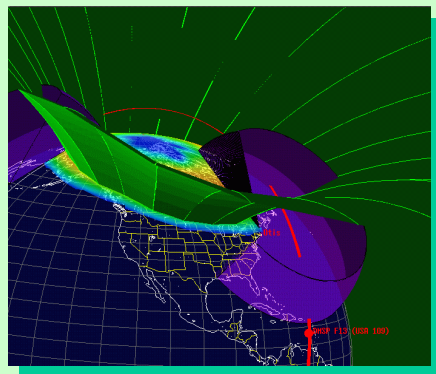
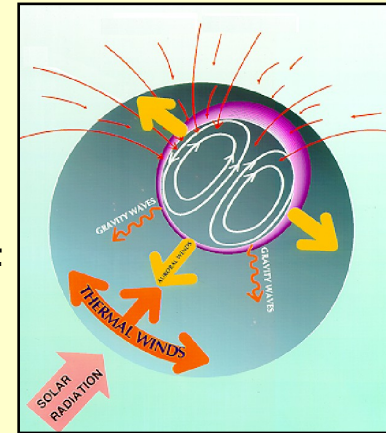
SPACE WEATHER

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- Ionospheric Scintillation:** Model ionospheric disturbances that cause rapid phase and amplitude fluctuations of satellite signals and degrade or disrupt satellite-based nav and comm systems.



- Neutral Density:** Simulate changes in mesosphere and thermosphere neutral density, temperature, and winds so changes in the satellite-drag environment can be determined easily.

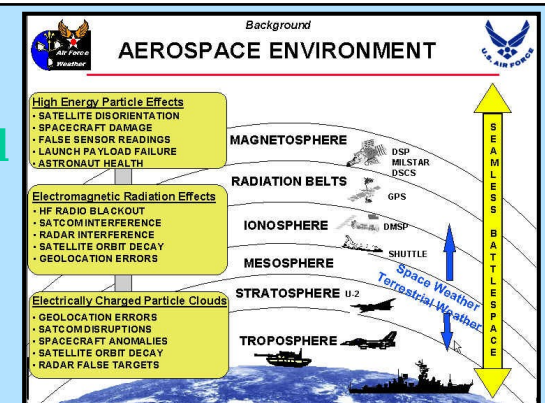


- GEOSpace:** Incorporate IonScint and NeutDens models and effects on space- and ground-based systems. Will

lation and satellite ~~provides~~ **provides** ~~dynamic~~ **dynamic**
 using climatology. scenarios to
 Int egrity in Service



- Space Wx Historical Archive:** Create a consistent, integrate near-Earth space environment historical solar cycles (weak, moderate, strong).





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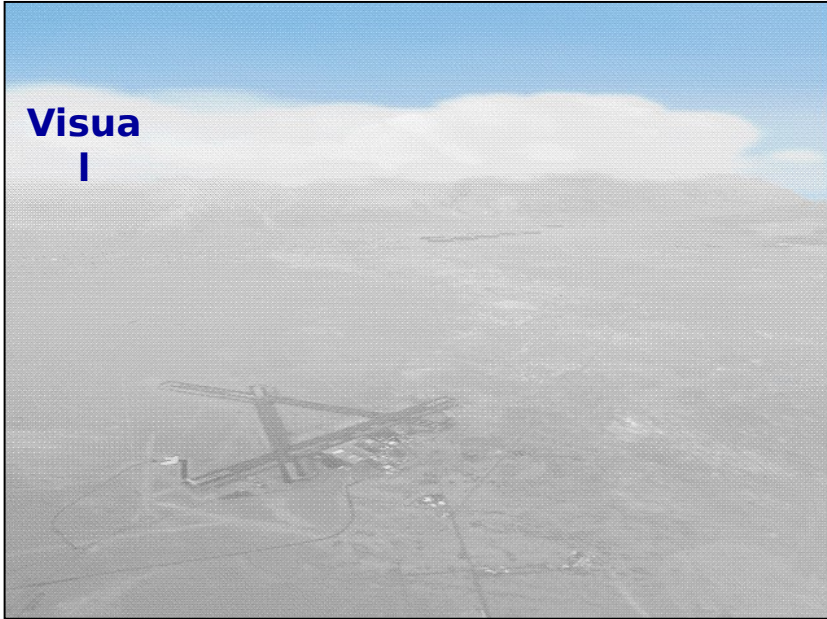
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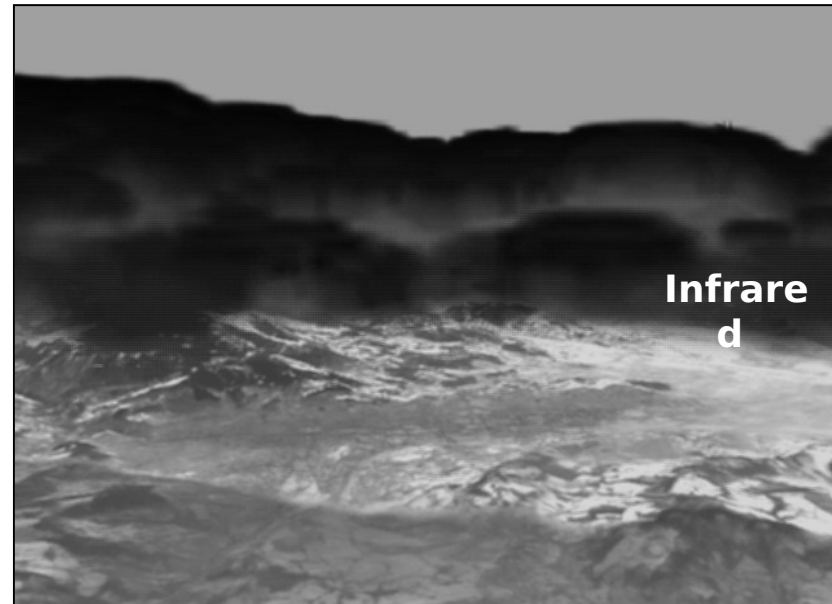
Cloud Scene Simulation Model Statistics (CSSMStats)

Visua
l



- Develop cloud scene inputs for simulations that run 25 - 1000 times faster than real time
- CSSMStats delivers probability curves enabling rapid, on-the-fly “calculations” for target acquisition

Infrare
d



- Conducted numerous computer runs for a variety of air/space platforms using a variety of targets
- Created probability tables using statistical results of weapon systems' MOEs



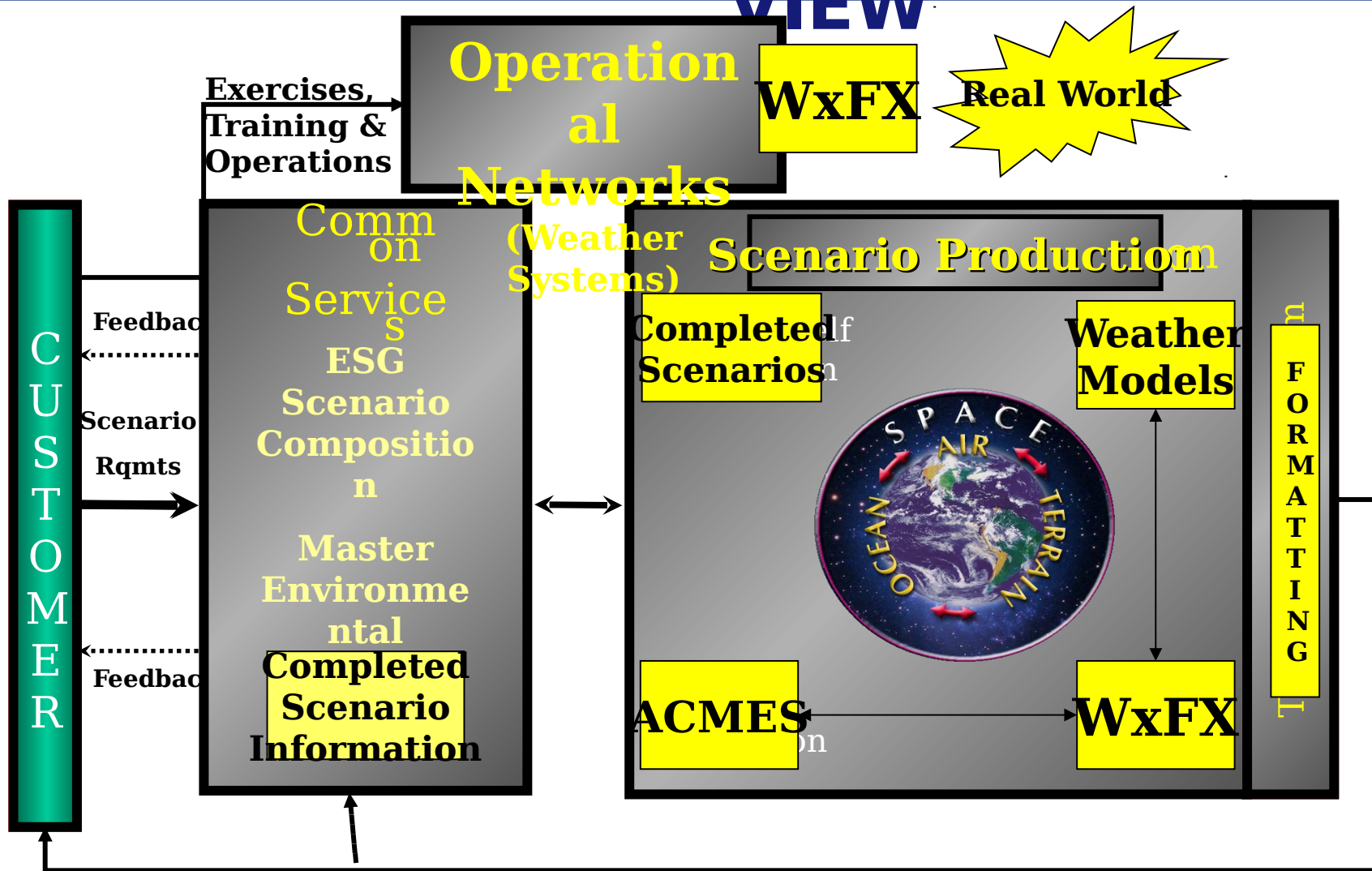
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ASNE NEAR TERM OPPORTUNITIES -- FUNCTIONAL

VIEW



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THE WAY AHEAD

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- **Continue Air and Space M&S efforts**
- **Physically consistent representation both within and among the Air, Ocean, Space, and Terrain domains**
 - **Integrate Ocean and Terrain segments of the authoritative representation with Atmosphere**
 - **Use ACMES to initialize Ocean models**
 - **With development of dynamic terrain technology, atmospheric influences reflected in terrain**
- **Deliver in a standard format that promotes interoperability, re-use, and confidence**
 - **Migrate to SEDRIS Transmittal Format to meet customer needs**
 - **Exploit existing post-processing software to meet operational needs**
- **Next Battlefield**



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Modeling & Simulation Executive Agent for the Air Force Natural Environment

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